Forest Site Management Section
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July 8, 1997

Silviculture Note 10

Final Report

Sx Trial 89-204-Q

Fertilization of Lodgepole Pine (Pli) at the Time of Sowing Hurley Creek, Five-year Results

Introduction

Fertilization at the time of sowing (FAS) has been considered one way of alleviating planting check of Pli. FAS has the advantage over other methods of fertilization because the treatment is applied at the nursery months before the trees arrive at the site. This trial examines three different FAS fertilizers and four different application rates on the outplanting performance of Pli seedlings.

Sites

The Hurley Creek test site is located in the Hope Creek drainage south of Goldbridge in the Lillooet Forest District (Figure 1). The site is in the moist, warm Engelmann Spruce-Subalpine Fir zone (Table 1). FAS was prescribed as a means of minimizing shrubby vegetation competition expected on this site.

FIGURE 1. Location of Hurley Creek FAS trial.

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TABLE 1. Site conditions for Hurley Creek FAS trial

Site conditions and history	
Biogeoclimatic zone	ESSFmw
Site series	(01) BlBa–Rhododendron
Moisture/Nutrient regime	4/C–D
Logged	1989
Site preperation	Broadcast slash burn 1990
Planted	1991

Species and Stock Type

Pli 3679 PSB 313B 1+0 spring-planted stock were used for this trial. At time of planting the unfertilized seedlings averaged 30 cm in height and the seedlings receiving the fertilization at the time of sowing, averaged approximately 35 cm in height.

Treatments

There were five FAS treatments involved in the trial (Table 2). Although these treatments were regarded as long-term in 1989, many nurseries have since adopted FAS treatment as a routine operational supplement to provide nutrients during nursery culture. The exact FAS recipes used vary depending upon the nursery, species and crop cycle.

The application rate delivered to each seedling was very small in relation to the conventional broadcast fertilizer rate of 32 g N/seedling recommended by Brockley (1988). In addition to the FAS treatment, all seedlings were fertilized throughout their nursery growth. The products used all have different release characteristics and different forms of N. Osmocote™ is an ammonia-N fertilizer with a hard resin coating that releases the fertilizer by rupturing. Nutricote™ is a nitrate-N fertilizer with a soft resin coating through which the fertilizer dissolves. Woodace ™ is an IBDU N-source fertilizer tablet that dissolves into both ammoniacal and nitrate-N. Release of fertilizer for all of these products is mediated by moisture and temperature. The duration of fertilizer release is the length of time that the fertilizer takes to leave the prill, **not** the length of time it takes before the fertilizer is initially released. Fertilizer is released immediately upon sowing. The expected duration of release is determined under laboratory conditions for specific temperatures and moisture content.

Results

All seedlings, regardless of fertilization treatment, displayed planting check in their first and second growing season, growing less than 10 cm over the two-year period.

Survival

With the exception of the highest Osmocote™ fertilization rate, the survival of all treatments was excellent (Figure 2). On average, the FAS treatments had 5% more mortality than the unfertilized control. This mortality occurred in the first year after planting. There were no obvious trends related to either the application rate or N-source. There was no obvious reason why the 20 kg Osmocote™ FAS treatment only had an 80% survival.

TABLE 2. FAS treatments used in Hurley Creek FAS trial

Treatment	Fertilizer rate in nursery (kg/m³)	Formulation	Duration (month)	Fertilizer rate (g/tree)	N rate (g N/tree)
Control					
Osmocote™	13	17-7-11	12	0.85	0.11
Osmocote™	20	17-7-11	12	1.30	0.23
Nutricote™	14.6	14-14-14	12	0.95	0.13
Nutricote™	20	14-14-14	12	1.30	0.18
Woodace™	11	20-4-11	8-9	0.72	0.14

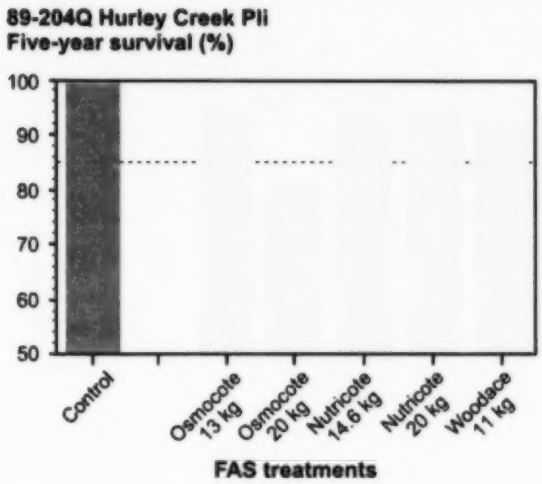

FIGURE 2. Fifth-year survival of FAS treatment combinations at Hurley Creek. The horizontal line at 85% is a reference line of silviculturally acceptable survival.

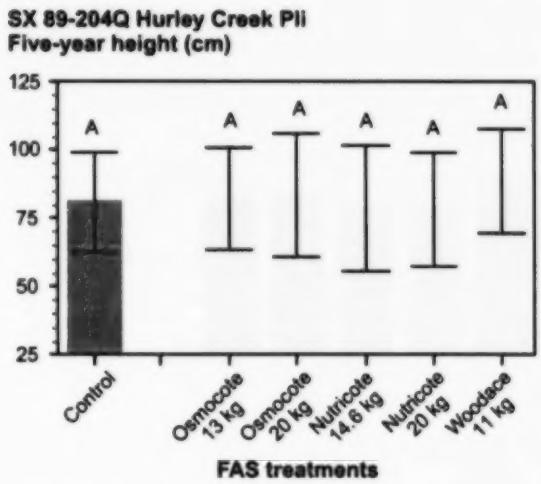

FIGURE 3. Fifth-year total height growth and standard error of the mean for different FAS treatment combinations at Hurley Creek. Treatment means marked with the same letter are not considered statistically significantly different at a probability of 5%. The error bar about the mean five-year height is the standard error of the mean.

Height Growth

There were no statistically significant differences between any of the FAS treatments and the unfertilized control (Figure 3). The first two years after planting displayed poor annual increment growth, which was not alleviated by the FAS. The FAS treatments were more variable than the unfertilized control, possibly as a result of an inconsistency in the amount of fertilizer incorporated at seeding. As with the results from FAS of Sx, the Woodace™ treatment was the best treatment and the Nutricote™ treatment, the smallest.

Conclusions and Recommendations

FAS had no benefit in alleviating planting check, nor did it provide any lasting benefit in improving survival and increasing growth. The factors that limited the growth of the unfertilized treatment were not alleviated by FAS. The fertilizers used in this study were only rated as 12-month duration under warm, moist nursery cultural conditions. Due to this release duration and the very small rates used in a two-year crop cycle, it is unlikely that there was any significant additional fertilizer left at planting.